ASIAN JOURNAL OF PHARMACEUTICAL SCIENCES 11 (2016) 126–127

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Formulation development and preparation of fish oil liposome by using high pressure homogenizer for food supplement product

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ARTICLE INFO

Article history:
Available online 25 November 2015

Keywords:
Fish oil
Liposome
High pressure homogenizer
Food supplement product

It is known that "Fish Oil" is the raw material that has lot of benefits for health, because fish oil consists of several necessary unsaturated fatty acids, particularly Omega-3 and Docosahexanoic acid (DHA). Omega-3 can decrease triglyceride level, and then it can increase HDL cholesterol level. In addition, DHA can support brain cell synthesis and also nervous system for human. However, fish oil has fishy smell and uncomfortable to eat. Nanotechnology, particularly liposome is a good choice for fish odor smell reduction and increase product acceptability [1]. Furthermore, nanotechnology improved oral dose and bioavailability of the fish oil liposome [2].

Fish oil liposomes were developed for determination of suitable ratio of liposome structure making substances that incorporated 14% w/w of fish oil in formulations. They were firstly prepared by modified ethanol injection using rotary evaporator [3]. The physical characteristics of formulations were defined as quality of colloidal system which no separation or sedimentation within 3 months in room temperature (30 ± 2 °C) and optimal pH values. The good appearance of formulation was chosen to further prepare by using high pressure homogenizer (Fig. 1A). The suitable ratio of liposome composition was developed and scaled up to 10 kilograms of fish oil liposome preparation. Both of particles size and zeta potential of fish oil liposome were analyzed by Zetasizer. The characteristic of particle was determined by scanning electron microscopy (SEM) as well (Fig. 1C). Moreover, fish oil liposome inspection was included pH value, microbiological test and nutrition test. Results showed that the good formulation of fish oil liposome was composed of phosphatidylcholine from soybean, cholesterol, span 80, tween 80 and preservative. Size of vesicle was 75.6 ± 3 nm and zeta-potential value was −44.29 ± 6.14 mV. Particle dispersion index (PDI) was 0.267 ± 0.007 and pH value was 4.53 ± 0.11. There were no microbial growth *of Salmonella* spp., *Staphylococcus aureus*, *Bacillus cereus*, *Vibrio cholera* and *Vibrio parahaemolyticus*. Peroxide and unsaponifiable matter value were in the range of standard for edible oil or lipid. Omega-3 content was 3000 mg/15 ml of fish oil liposome. It might be concluded that fish oil liposome product which prepared by high pressure

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Peer review under responsibility of Shenyang Pharmaceutical University.
http://dx.doi.org/10.1016/j.ajps.2015.11.094

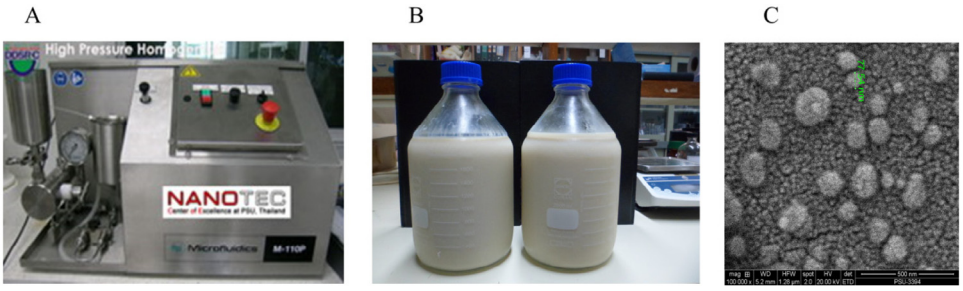

Fig. 1 – High pressure homogenizer (A); Fish oil liposome product (B); Liposome particles from SEM magnified 1×10^6 (C).

homogenizer was shown as high quality. This technique should be recommended for fish oil liposome processing in food supplement.

Acknowledgements

The authors acknowledge the financial support received from National Innovation Agency, Thailand and Kuang Pei San Food Products Public Co., Ltd, for their fulfills and encouragement in this work.

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